



Department of Energy

Ohio Field Office

Fernald Area Office

P. O. Box 538705

Cincinnati, Ohio 45253-8705

(513) 648-3155



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MAY 18 1999

Mr. Victor Petrolati
U.S. Department of Energy
1000 Independence Avenue, SW
Mail Stop: 6B-088, EE-91
Washington, D.C. 20585-0121

DOE-0770-99

Dear Mr. Petrolati:

1999 FEDERAL ENERGY AND WATER MANAGEMENT AWARDS

The Department of Energy, Fernald Environmental Management Project (DOE-FEMP) is pleased to submit the completed application for the 1999 Federal Energy and Water Management Awards. The project being nominated is the DOE-FEMP/Fluor Daniel Fernald Aquifer ReInjection Demonstration Project. This project involves the use of groundwater reinjection wells to enhance aquifer restoration at FEMP and it will greatly reduce the volume of water that will be pumped from the aquifer to achieve cleanup. Seven copies of the completed application, along with the cover sheet, are provided as an enclosure to this letter.

Please contact Mr. Johnny Reising, Associate Director of Environmental Management, at (513) 648-3139 if you have any questions regarding the application.

Sincerely,

Jack R. Craig
Director

FEMP:Kappa

Enclosure

MAY 18 1999

Mr. Victor Petrolati

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cc w/enclosure:

R. J. Janke, OH/FEMP

J. Reising, OH/FEMP

D. Brettschneider, FDF/52-5

D. Carr, FDF/52-2

D. Faris, FDF/65-2

L. Stebbins, FDF/50

AR Coordinator, FDF/78

cc w/o enclosure:

A. Tanner, OH/FEMP

1999 FEDERAL ENERGY AND WATER MANAGEMENT AWARDS COVER SHEET FOR AWARD NOMINATION

Please complete ALL sections. Nomination will be considered incomplete without this form.

AWARD CATEGORY (Please choose one)

- ☐ Energy Efficiency/Energy Management
☐ Renewable Energy
☒ Water Conservation (includes Beneficial Landscaping)
☐ Mobility Energy Efficiency
☐ Alternative Financing Project
☐ Exceptional Service Award

AWARD TYPE (choose only one)

- ☐ Individual
☐ Small Group*
☒ Organization

*Small Group consists of no more than five (5) individuals

PROJECT NAME: DOE-FEMP/FDF Aquifer ReInjection Demonstration
(If small group, name of small group project)

FEDERAL AGENCY: U.S. Department of Energy - Fernald Environmental Management Project

NOMINEE INFORMATION (If organization, please list name of contact person at organization facility. If small group, please list each individual group member name, address, e-mail, and phone number on separate sheet.)

Name: Johnny Reising

Title/Position: Assoc. Dir/Environmental Mgt.

Address: P.O. Box 538705

Cincinnati, OH 45253-8705

Phone No.: (513)648-3139 Fax No.: (513)648-3076

E-mail: johnny_Reising@fernald.gov

NOMINEE'S LOCAL NEWSPAPER

Name of Paper: Cincinnati Enquirer

Address: 312 Elm Street

Cincinnati, OH 45202

Phone No.: (513) 721-2700

PUBLIC AFFAIRS CONTACT

Name: Gary Stegner

Phone No.: (513)648-3153

FEDERAL AGENCY CONTACT POINT (See attached sheet for agency contact names)

Name: Johnny Reising

Title/Position: Assoc. Dir/Environmental Mgt.

Address: P.O. Box 538705

Cincinnati, OH 45253-8705

Phone No.: (513)648-3139 Fax No.: (513)648-3076

NOMINATOR INFORMATION

Name: Robert Janke

Title/Position: Team Ldr/Operable Unit 5

Address: P.O. Box 538705

Cincinnati, OH 45253-8705

Phone No.: (513)648-3124 Fax No.: (513)648-3076

Nominator Signature: Robert Janke

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Did this project receive a Federal Energy and Water Management Award in FY 1998? (If yes, this project cannot win in FY 1999.)

Yes _____
No X

Total Energy Cost Saved in FY 1998 \$ N/A (If applicable)

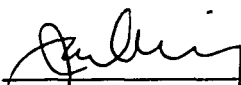
Total Btu Saved in FY 1998 N/A (If applicable)

The long term savings in operations and maintenance (O&M) costs associated with faster remediation of the aquifer is estimated at over \$50 million.

SUMMARY OF NOMINATION (no more than 100 words)

On separate sheet, please summarize your nomination, highlighting the significance of the achievement.

SUPERVISOR SIGNATURE/APPROVAL



Jack Craig, Director
Department of Energy
Fernald Environmental Management Project

SUMMARY OF NOMINATION

Environmental restoration at the Fernald Environmental Management Project (FEMP) involves the active restoration of contaminated portions of the Great Miami Aquifer, a high-yield, sole-source, sand and gravel aquifer. The remedial decision, approved by EPA and Ohio EPA, is a world-class, high-flow-rate pump and treat alternative that will restore the aquifer to full beneficial use, including use as a drinking water supply in approximately 28 years.

The DOE/Fluor Daniel-Fernald aquifer restoration team has determined that the use of groundwater re-injection could help reduce the time required to restore the Great Miami Aquifer to approximately 10 years.

A one-year, field-scale, groundwater re-injection demonstration began at Fernald on September 2, 1998. The purpose of the demonstration is to determine what role, if any, re-injection technology will play in the Fernald aquifer restoration. Deployment of the technology has the potential to save 3.57×10^{10} gallons of groundwater from needing to be pumped from the aquifer to achieve cleanup and a potential to save over \$50 million in operating costs.

The re-injection demonstration is unique in that it focuses on incorporating an additional technology into the site remediation strategy in a Post-Record of Decision (ROD) setting. To make the demonstration as efficient and cost effective as possible, it was actually incorporated into the selected aquifer remedy, not just a separate test. If the field-scale demonstration proves successful the application to the remedy will be immediate. An early agreement reached with the DOE Office of Science and Technology (OST) to conduct the demonstration in this manner showed much willingness on the part of OST management to be part of the solution to Fernald's groundwater remediation problems.

The final Record of Decision (ROD) for the aquifer remediation at the FEMP was signed in 1996. The ROD presented a 28 well pump-and-treat system, with an estimated cleanup time of approximately 27 years. The 28 high-capacity conventional extraction wells would pump at a collective flow rate of 4000gpm. In the ROD, the DOE agreed to continue evaluating emerging or innovative technologies which might enhance the aquifer restoration. At the time that the ROD was signed the use of solution mining techniques to remediate the Great Miami Aquifer beneath the Fernald site was being evaluated. An outcome of the evaluation was that re-injection, a large component of solution mining techniques, could possibly be used at the FEMP to enhance the aquifer restoration. Groundwater modeling indicated that re-injection provides four key benefits:

- the technology increases the overall groundwater flushing rate through the contaminated portions of the aquifer resulting in faster "pore volume turnovers" that directly contribute to contaminant removal from the aquifer.

- the technology helps minimize pumping-related drawdown impacts at neighboring properties adjacent to the FEMP facility. In concept, the aquifer "sees" only the hydraulic effect of the net extraction rate (difference between the pumping and re-injection rates).
- the technology provides an additional tool for handling localized "recalcitrant" zones which do not clean up as readily as the mainstream portions of the aquifer. Groundwater re-injection can help steepen flow gradients and shorten flow paths on a local scale to enhance recovery from difficult areas.
- the technology prevents excessive drawdown of the target zone by maintaining high water levels in the areas where intensive pumping is taking place. This promotes restoration of the full thickness of the target zone and minimizes the potential for trapping contaminants in the unsaturated zone above the pumping level.

Re-injection is not a cutting edge new technology, but it is a technology whose success is dependent upon unique site conditions. Successful re-injection at one site does not guarantee success at another similar site. Re-injection is therefore an unproven technology at the FEMP. The problem presented at Fernald was how to prove the technology, get stakeholder approval for the use of the technology, and get the technology incorporated into the aquifer remedy without jeopardizing progress being made to meet already agreed to regulatory milestones.

In conjunction with the DOE Office of Science and Technology (OST), a re-injection project team was established that included industry partners and a strategy to prove re-injection at the FEMP was established.

The proving strategy consisted of conducting short term single well tests, followed by a field-scale demonstration. Short term (less than a week) single well injection tests were conducted to

collect both physical and chemical data on the re-injection process. The single well injection tests showed that the aquifer was physically able to accept the re-injected water and that it would likely not be cost prohibitive to control plugging at the re-injection wells due to iron and bacteria. At the time that this paper is being written, the one-year field scale demonstration is into its 8th month, and so far the data collected looks very promising for the incorporation of re-injection into the aquifer remedy.

The use of re-injection will greatly reduce the volume of water that will be pumped from the aquifer to achieve cleanup. Assuming that groundwater modeling predictions for the use of re-injection are correct, and other site-restoration projects are completed as scheduled, the aquifer remedy will be shortened by approximately 17 years. Not having to pump at 4,000 gpm for 17 years, means that the volume of water to be pumped from the aquifer to achieve cleanup will be reduced by 3.57×10^{10} gallons of water.

The Fernald Re-Injection Demonstration Project represents a best effort of DOE-Fernald, Fluor Daniel Fernald (FDF) the Fernald site contractor responsible for restoration of the site, the OST, regulators, and stakeholders to seek an improvement to the Fernald baseline groundwater remediation strategy. Through the leadership of DOE-Fernald and with the support of the OST Subsurface Contaminants Focus Area, an innovative approach to demonstrate the feasibility of a promising approach to the groundwater remediation has been undertaken. This demonstration project is nearing completion, and the results are promising for the application of the new approach, and the realization of the benefits originally envisioned at the project's outset.

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DOE Office of Science and Technology
Fernald Re-injection Project
A Partnership for Technology Demonstration
and Deployment between the
Fernald Environmental Management Project,
Fluor Daniel Fernald and the
DOE Office of Science and Technology
Current re-injection rate: 1000 gallons/minute



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